Education in vascular surgery: Critical issues around the globe—training and qualification in vascular surgery in Europe

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In 1958, the Union Européene des Médecins Spécialistes (UEMS), or European Union (EU) of Medical Specialists the European Union, was founded by the professional organizations of medical specialists in Europe. Among the objectives of the UEMS are to promote the highest level of patient care in the EU and to promote the harmonization of high-quality training programs within the various specialities throughout the EU. Within the 38 Specialist Sections of the UEMS are the European Boards, which are the working groups of the Specialist Sections. In 2005 Vascular Surgery was recognized as a separate and independent Section, a monospecialty, within the UEMS. The efforts of the UEMS are directed at facilitating the free exchange of training and work of trainees and medical specialists between EU countries. This situation, in combination with large differences in requirements and length of training in vascular surgery within the EU, stresses the importance of harmonization in training and certification in vascular surgery within the EU. For that reason, the European Board of Vascular Surgery has organized voluntary examinations yearly since 1996. The candidates who pass qualify as "Fellow of the European Board of Vascular Surgery" (FEBVS) since 2005. The first part of the examination evaluates the eligibility of the candidate (Certificate of Completion of Specialist Training, training center, logbook). The second part is a viva voce assessment that includes (1) case analyses, (2) a review of a scientific article, (3) an overall assessment, (4) a technical skills, and (5) an endovascular skills assessment. To pass the examination, the candidates must achieve a 67% success rate in each part of the examination. During the last 10 years, approximately 75% of the candidates have successfully taken the examination. In the near future the Section and Board, in close collaboration with the vascular societies in the EU, will develop a European vascular surgical syllabus and curriculum that will further harmonize and professionalize the training and certification of vascular surgery in Europe. (J Vasc Surg 2008;48:69S-75S.)

Vascular surgery has developed considerably as a specialty during the last 50 years. It became independent from cardiovascular and general surgery in the 70s of the last century. During these years, many techniques of open surgical reconstruction were developed and became standardized. As science and surgical technique evolved, it was recognized that a more focused and specialized training was required. In the 90s more technology and noninvasive and endovascular techniques were developed. The orientation

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STATEMENT OF CONFLICT OF INTEREST: These authors report that they have no conflicts of interest with the sponsor of this supplement article or products discussed in this article.

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0741-5214/\$34.00

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doi:10.1016/j.jvs.2008.08.035

became more focussed on less invasive techniques, particularly endovascular surgical techniques, that required even more specialized training. Currently, many vascular surgeons believe their specialty is better defined as a vascular specialist or interventionalist rather than as a vascular or endovascular surgeon.

At the same time, more knowledge was generated and vascular surgery became more evidence-based than ever before. In addition, rapid globalization of medical specialization and international exchange is happening. All these rapid developments in skills and knowledge are reasons to professionalize the training and certification of vascular surgery similar to other specialties.

Europe is different compared with other continents because it consists of many countries with major differences in history, language, and culture, among others. At the same time, these many differences also facilitate many scientific and technical developments that are often original and creative solutions for an issue or problem. For these reasons, vascular surgery has evolved differently in each country within the European Union (EU). This article describes the current developments regarding training and certification in vascular surgery in the European Communion (EC).

THE UNION EUROPÉENE DES MÉDECINS SPÉCIALISTES AND VASCULAR SURGERY

In 1958 the Union Européene des Médecins Spécialistes (UEMS), or European Union (EU) of Medical Specialists, was founded by the professional organizations of medical specialists of the six member countries of which the EU consisted at that time with the objective to achieve a comparably high level of training for medical specialist of the six member countries. In 1962 Specialist Sections were created for each of the main disciplines practicing in the member states of the EU, among these the Section of (general) Surgery, which also included vascular surgery. Subsequently, the EU was enlarged, while at the same time the number of specialist sections was gradually increased to 38. Among the objectives of the UEMS are to promote a highest level of patient care in the EU and to promote the harmonization of high quality training programs within the various specialities throughout the EU.1

Within the 38 Specialist Sections are the European Boards, which are the working groups of the Specialist Sections and include representatives appointed by (inter)national scientific and academic bodies as well as representatives from the Specialist Sections.

The efforts of the EU and of UEMS are directed at facilitating the free exchange of training and work of trainees and medical specialists between the various member countries.

The first step in the evolution of vascular surgery in the EU was made in 1991 to organize a working group consisting of the representatives of 12 countries, "Vascular Surgery in the European Union." The objective was to define vascular surgery by making an inventory of the status of vascular surgery in the various countries, by harmonization of rules, regulations, and specialist training. At that time, vascular surgery was organized as a subsection under the umbrella of (general) surgery. In 1993 a Division of Vascular Surgery was established, still in association with and dependent of the Section of Surgery. But in 2005, Vascular Surgery was finally recognized as a separate and independent section with the UEMS. This recognition of vascular surgery as a monospecialty in Europe is very important because it implies that vascular surgery is officially represented and is officially involved in a number of issues. Among these are that the Vascular Surgery section:

- may act as a direct advisor to the European Communion, the European Parliament, and the Council,
- may gain direct dealing with governmental and health authorities at a national and European level national health systems,
- has the right to establish criteria for admission to training programs and centers and to define the appropriate curriculum and modalities for training in the vascular surgery specialty, and that
- 4. it can define guidelines for quality control in vascular surgical units, performance of professionals, and guidelines for certification of vascular surgeons and vascular centers.²

The Section and Board of Vascular Surgery has defined the specialty of vascular surgery as "the clinical and scientific discipline concerned with the diagnosis, treatment and prevention of diseases affecting arteries, veins and lymphatics" (http://www.uemsvascular.com/section-definition.htm).

Since the beginning, the Section and Board of Vascular Surgery has focused, in close cooperation with European vascular societies, on political issues and issues with other sections and boards, continuing medical education, accreditation, and certification and guidelines (eg, on the organization of vascular centers in Europe). Continuing efforts are needed for the harmonization of training and for the establishment of a European vascular surgical curriculum in the near future.

TRAINING IN VASCULAR SURGERY IN EUROPE

There are large differences in training in vascular surgery in the various European countries; most of these are related to existing associations between training in general and vascular surgery.³ Sandermann established a European Registry of Training Centers for Vascular Surgery (EuReg-Vasc). Although EurReg-Vasc has never been completed, the data provide an indication of the differences between training and training centers and confirm the wide variability of training. There are no reliable and complete data on training centers in the European countries. Obviously, the number of training centers per country varies considerably, the length of training years varies, the number of trainees per center varies between one and more than one, and the number of operations per center also varies considerably.⁴ A recent overview by Cronenwett and Liapis of various characteristics of the different training systems around the globe, including Europe, again confirms these differences (Tables I and II).5

The EU has developed a single market through a standardized system of laws that apply in all member states and guarantee the freedom of movement of people, goods, services, and capital. In the medical profession, this implies free exchange of training and work in (vascular) surgery between all member countries.⁶ It is obvious that, given these opportunities of free exchange and the large differences in training and certification between the member countries, harmonization of training and certification became a very important objective of the Section and Board of Vascular Surgery. However, it should be recognized that currently a European specialist qualification in any specialty, including vascular surgery, does not replace an accreditation by the national authorities, which is the primary specialist accreditation recognized by law by all member countries. It is also important to realize that medical licensing is still being determined by the individual member countries and cannot be replaced by a European organization. Thus, the European Qualification, entitling those who pass the examination as "Fellow of the European Board of Vascular Surgery" (FEBVS), is a voluntary exam-

Table I. Specialty status and minimum training requirements^a

	Specialty type	Year VS specialty	Year VS independent	Minimum training required		
Region/country				Years GS	Years VS	Total
Austria	S	1996	NA	6	3	9
Belgium	N^{b}	NA	NA	6	2^{c}	8
Croatia	S	1994	NA	4	2	6
Cyprus	I	1986	1990	3	4	7
Czech Republic	I	1989	1989	2	4	6
Denmark	I	1983	2000	2	5	7
Finland	I	1999	1999	3	3	6
France	I	1980	1988	2	4	6
Germany	I	1978	2005	3	3	6
Greece	I	1989	1989	3	4	7
Hungary	S	1980	NA	6	2	8
Ireland	N^b	NA	NA	7	2^{d}	9
Italy	I	1974	1974	1	4	5
The Netherlands	S	1985	NA	6	2	8
Norway	S	1986	NA	5	3	8
Portugal	I	1987	1987	2	4	6
Russia	N^{d}	NA	NA	2	3°	5
Slovakia	I	1986	2004	2	4	6
Spain	I	1978	1978	1	4	5
Sweden	S	2006	NA	5	2	7
Switzerland	S	2002	NA	6	3	9
Turkey	$N^{b,e}$	NA	NA	5	0	5
United Kingdom	N^{b}	NA	NA	8	2^{d}	8

GS, General surgery; I, independent; NA, not applicable; N, not a specialty; S, subspecialty; VS, vascular surgery.

ination and must be seen as a respected qualification and a European quality mark rather than a license to practice vascular surgery.7

QUALIFICATION IN VASCULAR SURGERY IN EUROPE

The European Board of Surgery Qualifications Vascular Surgery (EBSQ-VASC) examinations were held for the first time in Venice in 1996 and yearly thereafter. The EBSQ-VASC became the examination for the FEBVS in 2005. For practical purposes, the examinations are being held at the same time as the yearly meeting of the European Society for Vascular Surgery. Since the start, several reports and evaluations have been published.8 The chair of the examination committee, David Bergqvist, has published an overview of the examination as it is organized at this

In the first part of the examination, the candidate's eligibility is evaluated. To sit the examination, the candidate must submit:

1. A Certificate of Completion of Specialist Training (CCST) in general or vascular surgery (dependent on whether or not vascular surgery is recognized as an independent speciality in the candidates' member state),

- 2. A logbook with a list of his or her vascular and endovascular surgical experience (the application form with the exact eligibility criteria and the outline of the logbook is available at: http://www.uemsvascular.com/ebvs.htm). An important requirement is that the logbook has to be validated by the trainer of the candidate.
- 3. A letter from the national vascular society confirming that a proper vascular surgical training program according to the rules and regulations of candidates' member state has been completed.

An assessment committee, chaired by the EBSQ-VASC chairman, decides on the eligibility to participate in the second part of the examination. If necessary, additional information can be requested from the national representative within the UEMS.

The second part of the examination consists of a viva voce assessment which consists of (1) case analyses, (2) a review of a scientific article, (3) an overall assessment, (4) a technical skills assessment and (5) endovascular skills assessment. More than one assessor participates in each part of the examination to avoid subjectivity. In the case analyses part, several clinical cases are discussed (categorized under aneurysm, limb ischemia, miscellaneous, and endovascular) with help of radiologic or clinical images. To reduce subjectivity, the answers are predefined as much as possible.

Adapted from: Cronenwett JL, Liapis CD. Vascular surgery training and certification: an international perspective. J Vasc Surg 2007;46:621-9. Reprinted with permission of the Society for Vascular Surgery. bVS training incorporated into GS residency.

^cCertificate of competency awarded by society for additional VS training.

^dContained within GS training for selected trainees in special vascular units.

eVS training incorporated into cardiothoracic residency.

Table II. Program accreditation and trainee certification processes^a

					Examinations required?		
Region/country	Specialty type	Programs accredited by	Site visit required?	Trainees certified by	Written	Oral	Case load
Austria	S	National assoc	Yes	National assoc	No	No	No
Belgium	N^{b}	Specialty society	No	Specialty society	No	Yes	Y
Croatia	S	Government	No	Government	No	Yes	No
Cyprus	I	Government	No	Government	No	Yes	Yes
Czech Republic	I	Government	No	Government	Yes	Yes	Yes
Denmark	I	Government	Yes	Government	No	No	Yes
Finland	I	University	No	University	Yes	No	Yes
France	I	Government	No	Specialty society	Yes	Yes	Yes
Germany	I	National assoc	No	Specialty society	No	Yes	Yes
Greece	I	Government	No	Government	No	Yes	Yes
Hungary	S	Specialty society	Yes	Specialty society	No	Yes	Yes
Ireland	N^{b}	Specialty society	Yes	Specialty society	No	Yes	Yes
Italy	I	University	Yes	University	No	Yes	Yes
Netherlands	S	Specialty society	Yes	Specialty society	No	No	Yes
Norway	S	National assoc	Yes	National assoc	No	No	Yes
Portugal	I	National assoc	Yes	National assoc	Yes	Yes	Yes
Russia	N^c	Government	Yes	National assoc	Yes	Yes	Yes
Slovakia	I	Government	No	Specialty board	Yes	Yes	Yes
Spain	I	Government	No	Government	No	No	Yes
Sweden	S	Government	Yes	Specialty society	No	Yes	Yes
Switzerland	S	Specialty society	No	Specialty society	Yes	Yes	Yes
Turkey	$N^{b,c}$	Government	Yes	Government	Yes	Yes	Yes
United Kingdom	N^{b}	Specialty board	Yes	Specialty board	No	Yes	No

I, Independent; N, not a specialty; S, subspecialty.

The scientific part focuses on the candidates' ability to read, analyze, and assess the quality of a scientific paper. To this end, the candidate is questioned about a vascular surgical article of which the abstract, conclusion, and discussion have been removed. In the overall assessment part, the candidate is interrogated about such things as the logbook, clinical practice, indications for operations, continuing medical education, and research activities.

During the last 5 years, a practical skills examination has been included. This part of the examination was added because it was felt that surgical technical competence, certainly one the most critical aspects of surgery, was not evaluated but that we relied on information obtained from the candidates' trainer(s). Although they were probably in the best position to assess the technical competence of the candidate, it was believed that it was not reliable enough and most probably subjective. Another concern about technical surgical competence in the near future was a potential reduced competence due to reduced exposure to operative surgery because of a reduction in working hours as a result of the implementation of the European Working Time Directive.

Since 2002 a technical skills examination has been developed, structured, and validated by the EBVS, supervised by Pandey and Wolfe, who made a very substantial and valuable contribution. An important aspect is the use of procedure-specific evaluation rating scales [ICEPS, Imperial College Evaluation of Procedure-specific Skill]) and objective structured assessment of technical skills rating scales (OSATS, a

modified global rating scale of generic surgical skill (Figs 1 and 2). ^{10,11,12} Subsequently, the technical skills assessment has been further refined. ^{13,14} Since then, this part of the examination, consisting of the evaluation of (1) a dissection, (2) an anastomosis, and (3) knot tying, became an integral part of the examination by contributing to the overall score (Figs 3 and 4); in 2007, an endovascular part to the technical skills examination was added as a pilot project which will be evaluated and validated soon.

To pass the examination, the candidates must achieve a 67% success rate in each part of the examination (except the endovascular skills part, which awaits validation). During the last 10 years, approximately 75% of the candidates have successfully taken the examination (Table III).

FUTURE PERSPECTIVES

A next step would be the development of a vascular surgical syllabus and curriculum. Obviously, it is difficult to take an examination if no curriculum has been defined and the candidate does not know what to expect from the examination. The development of a European curriculum in vascular surgery is a considerable task that should be done by the EBVS in close cooperation with the professional vascular societies in Europe.

The EBVS continuously promotes the consideration of the FEBVS as the specialty examination in countries where such an examination is not required yet. Recently, initiatives on surgical specialist certification have expanded on a

^aAdapted from: Cronenwett JL, Liapis CD. Vascular surgery training and certification: an international perspective. J Vasc Surg 2007;46:621-9. Reprinted with permission of the Society for Vascular Surgery.

^bVascular surgery training incorporated into general surgery residency.

^eTraining incorporated into cardiothoracic residency.

Date:

Surgeon code: Procedure: Assessor: Please circle the candidate's performance on the following scale:

	1	2	3	4	5
Respect for tissue	Frequently used unnecessary force on tissue of caused damage by inappropriate use of instruments	2	Gareful handling of tissue but occasionally caused inadvertent damage.	4	5 Consistently handled tissues appropriately with minima damage.
Time and motion	1 Make unnecessary moves.	2	3 Efficient time/motion but some unnecessary moves.	4	5 Clear economy of movement and maximum efficiency.
Instrument handling	Frequently asked for the wrong instrument or used an inappropriate instrument	2	Competent use of instruments although occasionally appeared stiff or awkward.	4	5 Fluid moves with instruments and no awkwardness.
Suture Handling	Awkward and unsure with repeated entanglement, poor knot tying and inability to maintain tension.	2	Gareful and slow with majority of knots placed correctly with appropriate tension.	4	5 Excellent suture control with placement of knots and correct tension.
Flow of operation	1 Frequently stopped operating or needed to discuss the next move.	2	Demonstrated some forward planning and reasonable progression of procedure.	4	5 Obviously planned course of operation with efficiency from one move to another
Knowledge of procedure	Insufficient knowledge. Looked unsure and hesitant.	2	3 Knew all important steps of the operation.	4	5 Demonstrated familiarity with all steps of the operation.
Overall performance	1 Very poor	2	3 Competent	4	5 Clearly superior
Quality of final product	1 Very poor	2	3 Competent	4	Clearly superior

Total score:

Fig 1. Example of an objective structured assessment of the technical skills rating scale used for the evaluation of technical skills as part of the Fellow of the European Board in Vascular Surgery examination.

Imperial Saphenofemoral Junction Ligation

CollegeCandidate no:Evaluation ofAssessor:Procedure-specificDate:Skill

Please circle the candidate's performance on the following scale:

	1	2	3	4	5	
Incision	Does not use surface landmarks. Inappropriate placement of incision. Poor handling of scalpel	2	Appropriate incision in terms of location and size. Looked at ease with scalpel	4	5 Uses surface landmarks to make an appropriately located and sized incision Handled scalpel expertly	
Dissection	Appeared unsure and excessively hesitant whilst dissecting. Caused trauma to tissues. Did not dissect into the correct anatomical plane.	2	Gontrolled and safe dissection into correct anatomical plane. Caused minimal trauma of tissues. Used instrument satisfactorily whilst dissecting.	4	Superior and atraumatic dissection into the correct anatomical plane. Confident handling of instruments whilst dissecting.	
Retraction	Clumsy use of retractors. Did not allow visualisation of important structures making frequent changes to retractor setting.	2	Good use of retraction allowing visualisation of major structures. Had to change retractor position to visualise other structures	4	5 Excellent use of retractors. Allowed good visualisation of all necessary structures. Atrauamtic	
Tributaries	Could not or did not try to identify any tributaries	2	3 Identified all known tributaries. Did not seek other vessels	4 5 Identified all known tributaries. Sought of possible tributaries.		
Haemostasis	Poor quality of knot tying, Knots frequently slipped or was excessively traumatic to vessels	2	Competent knot tying. Minimal trauma to vessels. Minimal blood loss.	4 5 Superior knot tying. Atraumatic. No knot slippage		
SFJ Clearance	Did not identify the Saphenofemoral junction or excessively traumatic dissection around that vessel	2	3 Identified the Saphenofemoral junction. Safely dissected tissues away from vessel. Reasonable clearance of vessel. Minimal trauma	4 5 Identified the Saphenofemoral junction Expert dissection of tissues off the vessels Atraumatic. Cleared well proximally and distally.		
SFJ Ligation	1 Did not ligate the SFJ or ligated CFV or caused excessive encroachment onto CFV after SFJ Ligation	2	3 Good knot tying whilst ligating the SFJ. Minimal encroachment onto CFV following SFJ ligation.	4	5 Excellent safe and secure ligation of the SFJ. Flush ligation with no encroachment onto CFV	

Total score:

Fig 2. Example of an Imperial College Evaluation of Procedure-specific Skill (*ICEPS*) rating scale for a saphenofemoral ligation used for the Fellow of the European Board in Vascular Surgery examination.



Fig 3. Viva voce part of the Fellow of the European Board in Vascular Surgery examination.



Fig 4. Skills part of the Fellow of the European Board in Vascular Surgery examination.

European level (Glasgow Initiative). A number of specialty examination boards expressed the wish to come together to explore the possibility of working together in developing the process of assessing trainees in their professional development, resulting in the establishment of a "Council for European Specialist Medical Examinations or Assessments" (CESMA). Currently, almost all of the 38 Specialist Sections are working together within CESMA to harmonize specialist certification in Europe.

It can be expected that the development of a curriculum and the continuous professionalization of the examinations on a European level will further harmonize and professionalize the training and certification of vascular surgery in Europe.

Table III. European Board of Vascular Examinations since 1996

Year	Place	Candidates, No.	Passed candidates, No.
1996	Venice	15	13
1997	Lisbon	20	16
1998	Paris	16	13
1999	Copenhagen	13	13
2000	London	17	12
2001	Lucerne	26	17
2002	Istanbul	24	17
2003	Dublin	14	12
2004	Innsbruck	20	17
2005	Helsinki	29	26
2006	Prague	26	23
2007	Madrid	33	27

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Submitted Jul 23, 2008; accepted Aug 12, 2008.

DISCUSSION

Dr Kevin Lye (Honolulu, Hawaii). What is the actual cost to the candidates taking the European Board of Surgery Qualification in Vascular Surgery exam?

Dr Johan Hajo van Bockel. There are two parts. There is €350 to qualify for the first part and €350 for the second part. And of course, you have travel and hotel expenses, so it is quite expensive.